



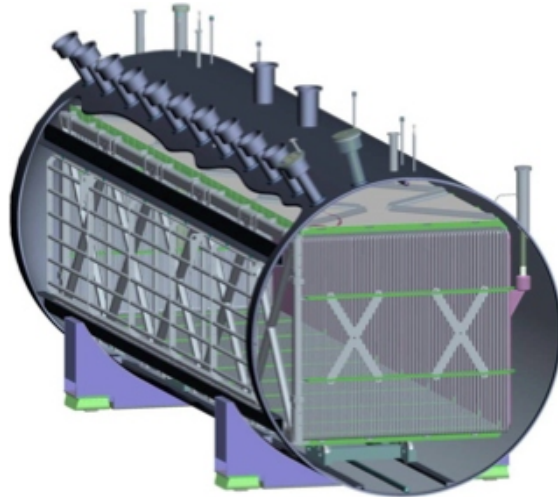
ILLINOIS INSTITUTE
OF TECHNOLOGY



MicroBooNE Update

Ryan Dorrill (IIT)

Proton PMG, All Experimenters Meeting
March 4th 2021





Current Status and Plans



- MicroBooNE held its virtual collaboration meeting last month: Feb 8-12
- Regular weekly LArTF walkthroughs continue with run coordinators and ND technical support team
- Filter regenerations for ICARUS and ICEBERG are also ongoing using the MicroBooNE cryogenics system at LArTF
- Data-taking has periodically resumed for the first of MicroBooNE's R&D studies since entering "safe mode" in March 2020
 - Detector systems and HV were successfully powered and used to take data
 - Remote shifts and operations are continuing for now
- Two studies completed so far:
 - Study of Single Photo-Electron Rates as a function of High Voltage (HV)
 - Study of Unwanted Grounds and Associate Noise (analysis ongoing)
- A rough schedule for upcoming **R&D Projects** is in place, though subject to change
 - The initial emphasis is on studies which can be performed remotely, with minimal risk and personnel requirements, and with remote checklist shifts
 - The experiment is not requesting 24/7 neutrino beam. However, if beam is running for other experiments, we can potentially make use of it in future studies

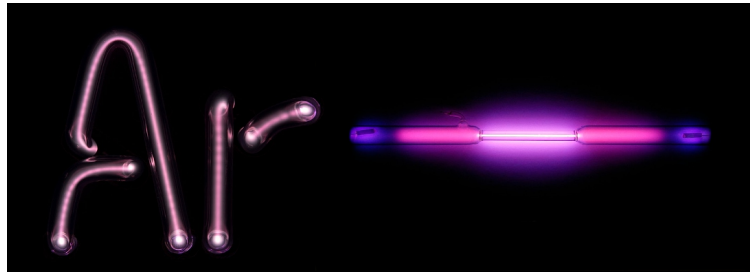


The R&D Phase is Ongoing



The list of potential R&D proposals includes the following:

- **Study of Single Photo-Electron Rates as a function of High Voltage (Complete)**
- **Testing of noise and unwanted grounding schemes (complete)**
 - **Further grounding studies to begin in the coming weeks**
- Study of the grounding scheme for the laser system (requested by DUNE)
- Study of Noise from Weiner Power Supply
- Argon purity studies
- Radon Doping of MicroBooNE for studies of low energy, MeV scale events
- Study of Single PE rates with reverse HV polarity
- Investigate HV Issues above 70kV (potentially relevant to protoDUNE 'streamer' events)
- Self-triggering studies for DUNE

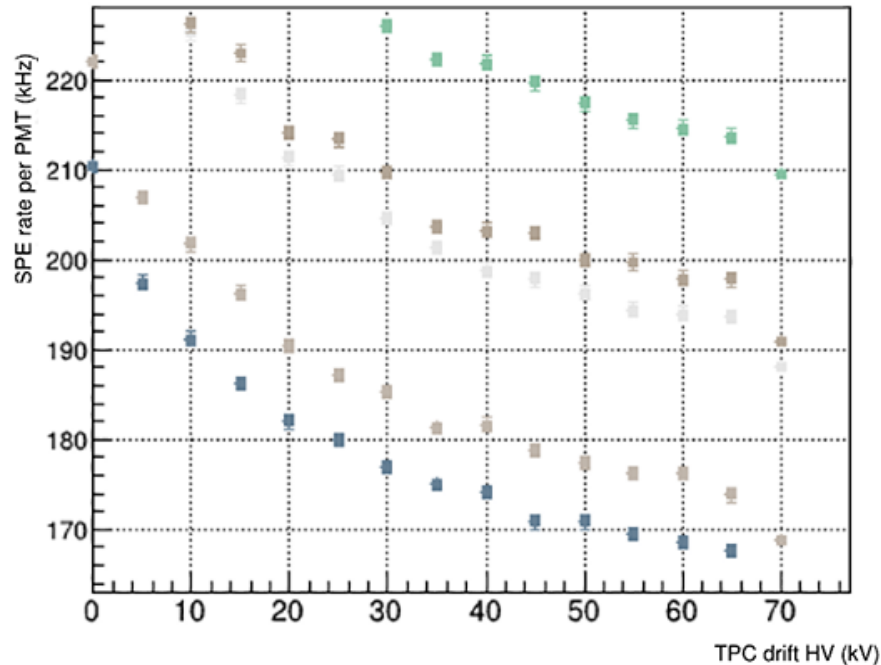




First R&D Studies Completed Remotely



SPE Rate Study (Dec-Jan 2021)



Plot: Ralitsa Sharankova

- **Study of Single Photo-Electron Rates as a function of High Voltage (HV)**
 - The detector was successfully turned on and took data after the long hiatus
 - Study performed with zero close-proximity work and no on-site access
 - Analysis is still ongoing
 - Initial results indicate ionization as the cause of the noise mechanism (e.g. from cosmics, betas, etc.)
 - Results to be published as part of a broader, light-based paper
- **Study of Noise and Unwanted Grounding Schemes**
 - DAQ and data taking were run stably for long periods (7 hrs)
 - 1 week of test data taken in various configurations
 - Analysis is pending



Data Processing



Data production is ongoing, including over 1,080,000 jobs last month!

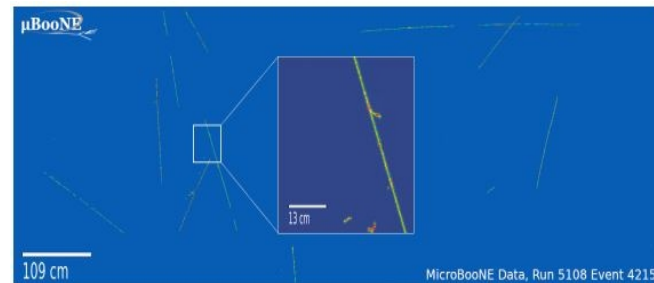


Publications



Many New Publications Have Been Submitted!

- “*Measurement of the Atmospheric Muon Rate with the MicroBooNE Liquid Argon TPC*”, arXiv:2012.14324, accepted to JINST (plots at right →)
- “*Semantic Segmentation with a Sparse Convolutional Neural Network for Event Reconstruction in MicroBooNE*”, arXiv:2012.08513, accepted to PRD
- “*Cosmic Ray Background Rejection with Wire-Cell LAr TPC Event Reconstruction in the MicroBooNE Detector*”, arXiv:2101.05076, submitted to PRD
- “*Measurement of the Flux-Averaged Inclusive Charged Current Electron Neutrino and Antineutrino Cross Section on Argon using the NuMI Beam and the MicroBooNE Detector*”, arXiv:2101.04228, submitted to PRD
- MicroBooNE had **fourteen publications** last year, and **19 public notes**
 - Five additional publications have also been submitted, awaiting review!



Above: a muon event in MicroBooNE.
Below: flux vs. elevation

